

國立臺灣科技大學

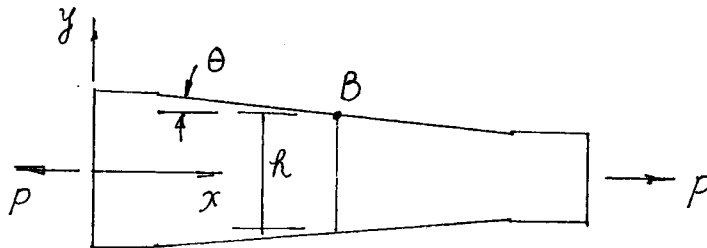
九十四學年度博士班招生考試試題

系所組別：機械工程系甲一組

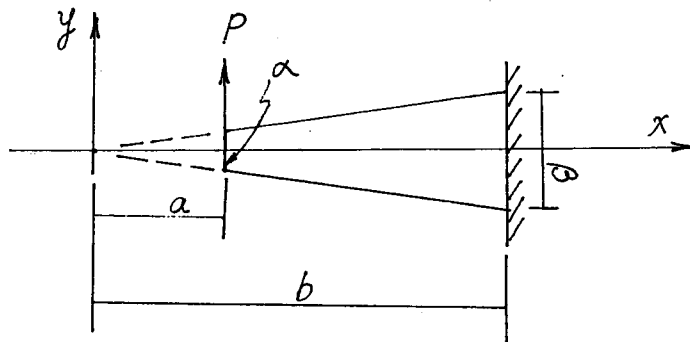
科 目：彈性力學

總分 100 分

1. A tapered plate of constant thickness,  $t$ , carries an axial tensile load,  $P$ . If  $\sigma_{xx} = P/ht$  at point B, what must  $\sigma_{yy}$  and  $\sigma_{xy}$  be at that point? (25%)



2. Consider a cantilever beam of constant thickness,  $t$ , with a linear taper from  $x = a$  to  $x = b$ . The height of the beam cross section is  $\alpha$  at  $x = a$  and  $\beta$  at  $x = b$ . The taper ratio  $\alpha/\beta$  is sufficiently small. The beam is fixed at  $x = b$ . It is subjected to a concentrated load,  $P$ , at the free end  $x = a$ . Find the deflection of the beam for  $a \leq x \leq b$ . (25%)



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3. A rotating uniform annular plate with inner radius  $a$  and outer radius  $b$  as shown in Figure 3. Assume the constant rotational speed be  $\Omega$ , free at both ends and neglect the gravitational body force. Please derive the stress distributions of the plate due to rotation. (25%)

4. A 6 by 6 in. slender angle of  $3/4$  in. thickness is subjected to oppositely directed end couple  $M_z = 100,000$  in.-lb, at the centroid of the cross section as Figure 4 shows. What bending stresses exist at a point A and B away from the ends? (15%) Determine the orientation of the neutral axis (10%)

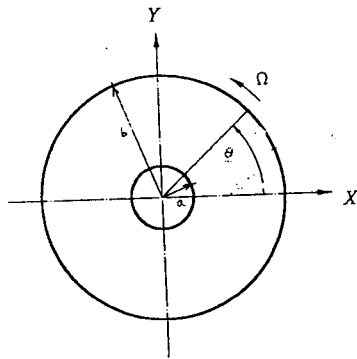


Figure 3: A rotating plate

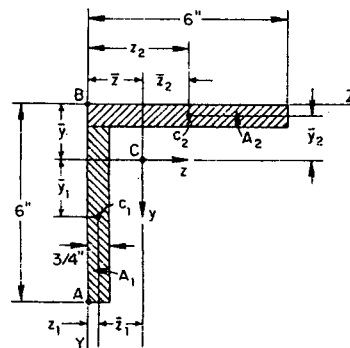


Figure 4: A slender angle

